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Marshall Space Flight Center



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Zeta Potential Control for Electrophoresis Cells

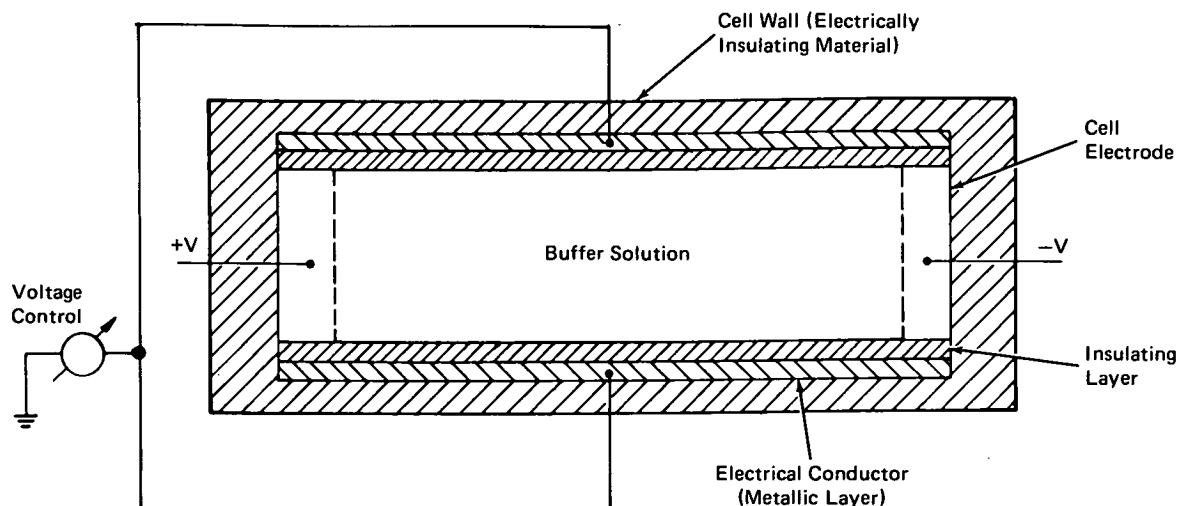
In electrophoresis cells, particles in an electrolyte are subjected to an electric field. The particles begin to move toward the electrode of opposite charge, the rate of migration being different for different kinds of particles. This phenomenon is frequently used in biochemistry to separate mixtures of proteins or other substances. Because each species migrates at a different rate, zones of each different species are formed.

One of the factors affecting the resolution in this technique is the "zeta potential". It arises from the fact that ions tend to be adsorbed on the surface of the cell walls. It is generally thought that this causes the formation of a double layer of closely held dehydrated ions and of diffused hydrated ions along the cell wall. This layer acts much like a capacitor and has an electrokinetic potential often called the "zeta potential".

This zeta potential tends to interfere with the electric field sensed by the migrating particles and degrades the resolution of the separation. However,

each particle has a similar zeta potential arising from the presence of a hydrated sphere surrounding it. If the zeta potential of the cell wall can be made to match that of the particles, the effect of the cell walls on the migration can be considerably reduced.

The wall zeta potential can be controlled by the addition of an electrically insulated conductor along the cell walls. A positive or negative electric potential applied to the conductor induces a charge of opposite sign on a thin insulating layer. By regulating the sign and magnitude of the applied potential, the induced charge can be used to increase or decrease the effective wall zeta potential. This is the technique shown in the illustration. The thin conductor is a layer sandwiched between the insulating cell wall and a layer of insulation that becomes the new interior cell wall. To match the wall potential to zones of different species in the mixture, the conductor layer may comprise two or more independently controlled segments.



Electrophoresis Cell With Zeta Potential Control

(continued overleaf)

Note:

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer

Marshall Space Flight Center

Code A&PS-TU

Marshall Space Flight Center, Alabama 35812

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Patent status:

Inquiries concerning rights for the commercial use of this invention should be directed to:

Patent Counsel

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